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# ***Selection Criteria and Facilitation Training for the Study of Groupware***

## ***FINAL REPORT***

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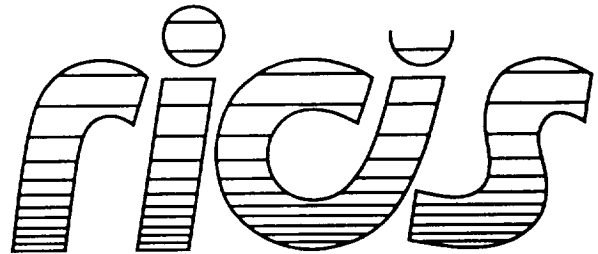
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*Research Institute for Computing and Information Systems  
University of Houston-Clear Lake*

# **TECHNICAL REPORT**

## *The RICIS Concept*

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The University of Houston-Clear Lake established the Research Institute for Computing and Information Systems (RICIS) in 1986 to encourage the NASA Johnson Space Center (JSC) and local industry to actively support research in the computing and information sciences. As part of this endeavor, UHCL proposed a partnership with JSC to jointly define and manage an integrated program of research in advanced data processing technology needed for JSC's main missions, including administrative, engineering and science responsibilities. JSC agreed and entered into a continuing cooperative agreement with UHCL beginning in May 1986, to jointly plan and execute such research through RICIS. Additionally, under Cooperative Agreement NCC 9-16, computing and educational facilities are shared by the two institutions to conduct the research.

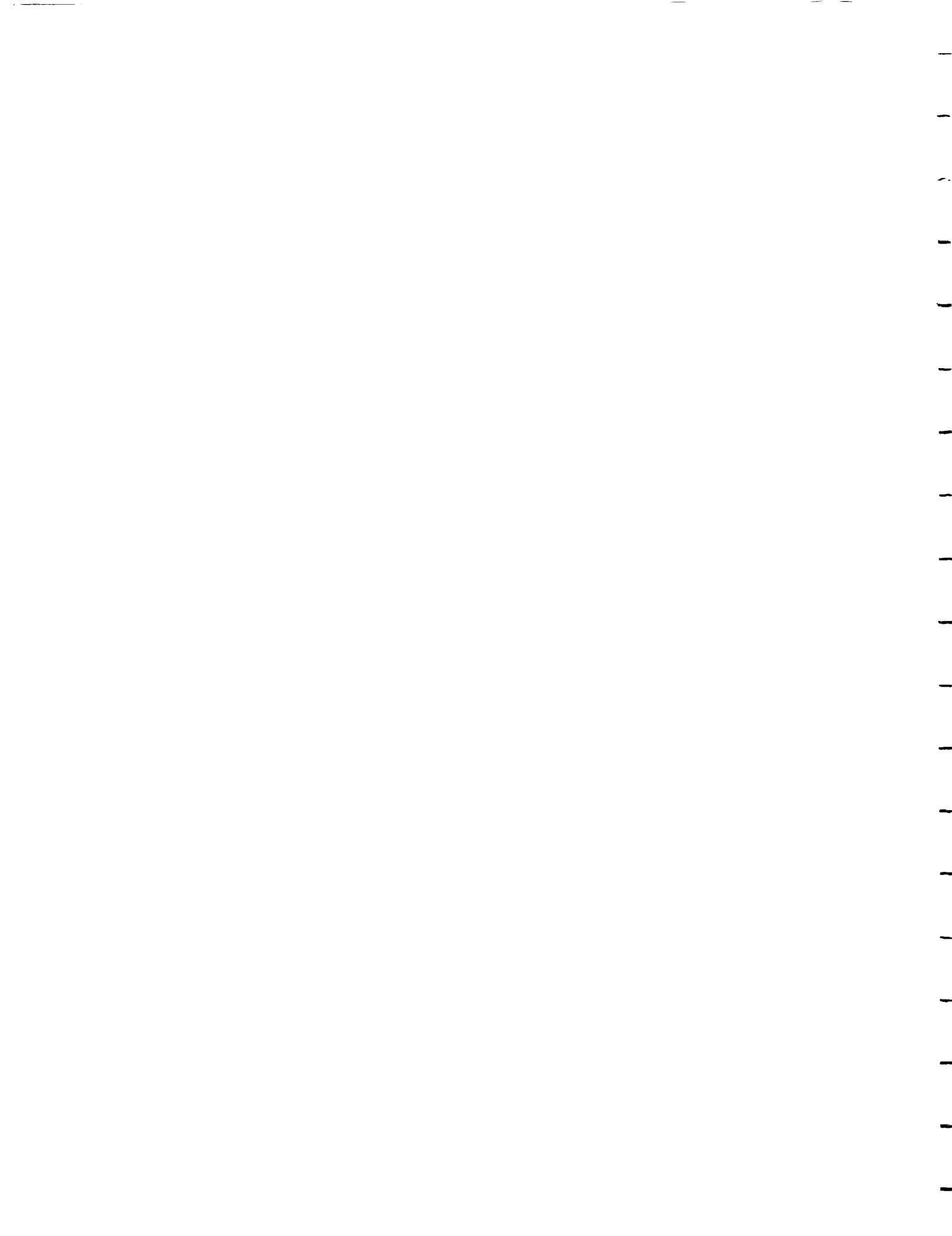
The UHCL/RICIS mission is to conduct, coordinate, and disseminate research and professional level education in computing and information systems to serve the needs of the government, industry, community and academia. RICIS combines resources of UHCL and its gateway affiliates to research and develop materials, prototypes and publications on topics of mutual interest to its sponsors and researchers. Within UHCL, the mission is being implemented through interdisciplinary involvement of faculty and students from each of the four schools: Business and Public Administration, Education, Human Sciences and Humanities, and Natural and Applied Sciences. RICIS also collaborates with industry in a companion program. This program is focused on serving the research and advanced development needs of industry.

Moreover, UHCL established relationships with other universities and research organizations, having common research interests, to provide additional sources of expertise to conduct needed research. For example, UHCL has entered into a special partnership with Texas A&M University to help oversee RICIS research and education programs, while other research organizations are involved via the "gateway" concept.

A major role of RICIS then is to find the best match of sponsors, researchers and research objectives to advance knowledge in the computing and information sciences. RICIS, working jointly with its sponsors, advises on research needs, recommends principals for conducting the research, provides technical and administrative support to coordinate the research and integrates technical results into the goals of UHCL, NASA/JSC and industry.

***Selection Criteria and Facilitation  
Training for the Study of Groupware***

***FINAL REPORT***



## **RICIS Preface**

This research was conducted under auspices of the Research Institute for Computing and Information Systems by Dr. Barry P. Robichaux of the University of Houston Main Campus. Dr. Charles Hardwick and Dr. David Palumbo served as RICIS research coordinators.

Funding was provided by the Information Systems Directorate, NASA/JSC through Cooperative Agreement NCC 9-16 between the NASA Johnson Space Center and the University of Houston-Clear Lake. The NASA research coordinators for this activity were Wallace F. Stewart, Manager, Continuous Improvement, Office of Assistant Director for Information Technology, Information Systems Directorate, NASA/JSC and Robert B. MacDonald, Research, Education, and University Programs Manager, Technology Development Division, Information Systems Directorate, NASA/JSC.

The views and conclusions contained in this report are those of the author and should not be interpreted as representative of the official policies, either express or implied, of UHCL, RICIS, NASA or the United States Government.



# TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	i
I. INTRODUCTION .....	1
II. BACKGROUND .....	1
III. PRIOR RESEARCH .....	13
IV. SELECTION CRITERIA .....	19
V. FACILITATION TRAINING .....	23
VI. CONCLUSION .....	32
VII. REFERENCES .....	34





## EXECUTIVE SUMMARY

Computer support for planning and decision making groups is a growing trend in the 90s. **Groupware** is a name often applied to group software and has been defined as "computer-based systems that support groups engaged in a common task (or goal) and that provide an interface to a shared environment". Unlike most single-user software, groupware assists user groups in their collaboration, coordination, and communication efforts. This paper focuses on groupware to support the meeting process. These systems are often called group decision support systems (GDSS), electronic meeting systems (EMS), or group support systems (GSS). The term **meeting support groupware** is used here to include any computer-based system to support meetings. In order to understand this technology, one must first understand groups, what they do and the problems they face, and groupware, a wide range of technology to support group work.

Most definitions of groups stress the ideas of interaction, interdependence, mutual awareness, a past, and an anticipated future. Much of the world's business, and pleasure, takes place in groups. Peter Drucker projected that the organization of the future will require development of professionalism through increased use of groups in the form of task forces. Due largely to the many quality programs being introduced into corporations today, the 1990s represent a period of high interest in groups and teamwork.

Much of the work done by groups is accomplished in meetings. Six group activities that are common to meetings and supported by groupware include: 1) **communicate** (exchange information), 2) **define** (state limits, frames, or outcomes), 3) **generate** (create new information or access relevant information), 4) **organize** (classify or categorize information), 5) **evaluate** (judge the merit of information), and 6) **select** (choose information priorities). Several meeting problems, such as domination by some members and fear of reprisal by others, are addressed by meeting support groupware.

Meeting support groupware has been found to improve group processes and outcomes in a majority of studies. However, there are enough differences across studies (e.g., laboratory versus field studies) to merit careful attention to the groups that are studied and the guidance (facilitation) that is provided to them. In addition to specific research objectives, the researchers undertaking any research plan should consider their impact on the groups that they are studying and the impact of these same groups on the overall research plan. In general, selected groups must be compatible with the resources (e.g., people, equipment, facility, purposes) available. Appropriate selection criteria will help bring this about. Proper facilitation may also provide the best opportunity for supporting and studying groups. Facilitation is viewed as a set of functions or activities that are carried out before, during, and after a meeting to help the group achieve its outcomes.

Guidelines for selecting groups for study as part of an overall research plan are provided in this document. These were taken from the literature and from persons for whom the information in this paper was targeted. Also, guidelines for facilitation training are discussed. Familiarity with known and accepted techniques are the principle duties of the facilitator and any form of training must include practice in using these techniques.



# I. INTRODUCTION

Computer support for planning and decision making groups is a growing trend in the 90s. **Groupware** is a name often applied to group software and has been defined as "computer-based systems that support groups engaged in a common task (or goal) and that provide an interface to a shared environment" (Ellis, *et al.*, 1991). Unlike most single-user software, groupware assists user groups in their collaboration, coordination, and communication efforts (Marshall, *et al.*, 1991). This paper focuses on groupware to support the meeting process. These systems are often called group decision support systems (GDSS) (DeSanctis and Gallupe, 1987), electronic meeting systems (EMS) (Dennis, *et al.*, 1988), or group support systems (GSS) (Jessup and Valacich, 1993). The term **meeting support groupware** will be used here to include any and all computer-based systems to support meetings.

This paper provides findings and recommendations from several relevant research literatures (psychology, social psychology, communication, information systems) with respect to the support and study of groups, especially in computer-supported environments. Two issues related to the study of meeting support groupware are the selection criteria for groups to be supported and studied and group facilitation training. Organizations considering meeting support groupware implementation and researchers studying their impact may find group selection to be a critical decision. For groups using this technology, proper meeting management skills are necessary to achieve task outcomes; trained facilitators can steer groups toward such productive ends. Background information and prior research are presented in the next two sections.

# II. BACKGROUND

Before addressing the literature findings on group selection and facilitation training, background on groups and groupware is provided. This section discusses groups and the groupware used to support them. The first part defines groups and the group meeting and identifies problems common to meetings and techniques used to help overcome these problems. The second part provides a history of groupware and different types of groupware support, with particular attention to meeting support groupware.

## A. Groups

Most definitions of groups stress the ideas of interaction, interdependence, mutual awareness, a past, and an anticipated future. Thus, a useful definition for a group is that it is two or more persons who are interacting with one another in such a manner that each person influences and is influenced by each other person (Shaw, 1981) in an ongoing manner. Much of the world's business, and pleasure, takes place in groups. Groups are the instruments through which much work gets done, and are also instruments for influencing, shaping, and changing the individuals who are their members (McGrath, 1984).

Peter Drucker (1988) projected that the organization of the future will require development of professionalism through increased use of task forces. Due largely to the many

quality programs being introduced into corporations today, the 1990s represent a period of high interest in groups and teamwork (Katzenbach and Smith, 1993). However, group work is not a new concept. It can be traced back to the Greeks who developed groups as tools in learning and in religion (Keltner, 1989). In this country, the first half of the twentieth century marked a period of great interest in the study of groups and group dynamics (e.g., Lewin, 1951).

Organizations have long considered groups to have many advantages over individuals. These advantages are often referred to in meetings as **process gains** (Steiner, 1972) and may include (Nunamaker, *et al.*, 1991):

- **More information** - a group has more information than any one member.
- **Synergy** - each member uses information in a way that is different from the way every other member does because each member has different information or skills.
- **More objective evaluation** - groups are better at catching errors in proposed ideas than are the individuals who proposed them.
- **Stimulation** - working as a part of a group may stimulate and encourage individuals to perform better.
- **Learning** - members may learn from and imitate more skilled members to improve performance.

Some have argued (e.g., Allport, 1924) that only individuals are real; that groups are no more than sets of values, ideas, thoughts, etc., that exist simultaneously in the minds of these individuals in collectivities. Others (e.g., Warriner, 1956) argue just as strongly that groups are entities and should be treated like other unitary objects in our environment. Those taking a middle ground on this issue (e.g., Campbell, 1958) maintain that entities, including groups, vary in the degree to which they are "real" and that the problem is one of determining the degree of being an entity. One who would study groups accepts their existence. The area of group dynamics (see Lewin, 1951) addresses many issues and questions, such as what is the ideal group size? Of most importance to this study are how we might study groups to learn about group processes and how we might intervene to influence these processes. The use of technology and facilitation are two examples of group process interventions that might be used in group meetings.

Whether exchanging information or making a decision, groups typically participate in several meetings throughout their existence in organizations. Group meetings are now discussed.

## 1. The Group Meeting

A **meeting** is an assembly of persons sharing a common purpose. Meetings can also be viewed as goal- or outcome-oriented interactions ... interactions that utilize a set of resources (people, technology) to transform a group's present problem state into its desired future state (achieving specific meeting outcomes) through a series of action steps (Bostrom, *et al.*, 1993). Six group activities common in these steps are 1) **communicate** (exchange information), 2) **define** (state limits, frames, or outcomes), 3) **generate** (create new information or access relevant information), 4) **organize** (classify or categorize information), 5) **evaluate** (judge the merit of information), and 6) **select** (choose information priorities) (Bostrom and Anson, 1990). Groups typically meet in face-to-face settings and adopt some turn-taking protocol for speaking.

Every meeting must first be justified, i.e., the question "is the meeting necessary?" must be answered affirmatively. If this is the case, one or more meeting objectives which are 1) results-oriented, 2) measurable, and 3) do-able should be clearly stated (Newman and Lynch, 1983). These meeting deliverables then provide the impetus for planning the meeting. If you are given the responsibility for calling a meeting, don't do so if any of the following are true (Bell, 1990):

- you have no clear agenda in mind,
- you're relying on meeting participants to come up with agenda items,
- you could postpone the meeting without causing problems,
- you plan to do all the talking in the meeting,
- you've already made a decision and want to convene the group merely as a rubber stamp, or
- you have no idea how long it will take to deal with your agenda items.

As suggested by a few items in the above list, agendas can be used to guide the group's activities during a meeting. They were also one of the first techniques advanced to help make meetings more productive (Dewey, 1910). Agendas break up group tasks into smaller, more manageable steps. The meeting leader or facilitator maps the meeting objectives to one or more meeting activities. When meeting support groupware is used, these activities can also be mapped to specific software tools. This will be discussed further later in the paper.

At least six different reasons can be given for calling and conducting meetings. These include 1) information presentation and exchange, 2) project collaboration, coordination and communication, 3) conflict resolution or crisis coping, 4) trend analysis and strategic planning, 5) improvement of existing work, and 6) training and development (Newman and Lynch, 1983). Each of these meeting types shares the need for proper planning and execution. Responsibility for these actions may rest with a group leader or with an external facilitator, a person who is not a member of the group.

The increased capabilities provided by groups do not come at no cost. Delbecq and Van de Ven (1971) indicate that social dynamics brought about by decision making in group settings have both positive and negative effects on problem solving creativity; however, on the whole, the positive effects outweigh the negative. The potential for creative decision making is greater in a group setting than by individuals working independently. Furthermore, group decision making techniques can be used to minimize the inhibiting influences on group performance. There are several problems related to group coordination that are common to meetings. These are often referred to as **process losses** (Steiner, 1972) and are discussed next. Techniques to minimize many of these problems are discussed thereafter.

## 2. Group and Meeting Problems

A recent survey of meetings in corporate America uncovered a problem: over 50% of the productivity of billions of meeting hours is wasted (Mosvick and Nelson, 1987). Studies have revealed that there are too many meetings, they last too long, and they are often woefully mismanaged. Given that the average manager and technical professional spends nearly 25% of their total workweek in meetings, the cost and subsequent drain on productivity is staggering. At the highest levels of management, as much as 80% of executives' time is spent in meetings.

Reasons for the lack of productivity in meetings include what Steiner (1972) labels **process losses**, aspects of meetings which impair outcomes relative to the efforts of individuals working by themselves. Nunamaker and colleagues (1991) identify several group communication problems found in typical face-to-face meetings. These can be divided into three broad categories: 1) sending - channel access, 2) sending - social influence, and 3) receiving and retaining (Robichaux, *et al.*, 1993).

**Sending - channel access** problems refer to the ability to present ideas to other members of the group and are related to turn-taking protocols. In typical face-to-face meetings, group members share speaking time, in some cases aggressively competing for the group's attention. This may result in some group members not have an opportunity to speak or may hinder their ability to generate ideas. Examples of sending - channel access problems are:

- **Air time fragmentation** - groups must partition available speaking time in meetings among members (Diehl and Stroebe, 1987). For example, five people might each have 12 minutes to speak during a one-hour meeting.
- **Attenuation blocking** - members who are prevented from contributing ideas when they think of them may forget or suppress them later in the meeting because they seem less original, relevant, or important (Diehl and Stroebe, 1987).
- **Concentration blocking** - fewer comments may be made because members concentrate on remembering their ideas (rather than thinking of new ideas) until they are able to contribute them (Diehl and Stroebe, 1987).
- **Attention blocking** - new ideas may not be generated because members must constantly listen to others speak and may not pause to think (Diehl and Stroebe, 1987).
- **Non assertive free riding** - members may rely on others to accomplish goals due to not wanting to compete for air time (Albanese and Van Fleet, 1985). For example, members may feel it is not worth the added effort of having to compete with others to present their ideas.
- **Time domination** - some group member(s) may intentionally monopolize the group's time in an unproductive manner (Jablin and Siebold, 1978). For example, two members may yield the opportunity to speak only to each other, not allowing others to speak.

**Sending - social influence** problems refer to the pressures to withhold ideas even when provided with an opportunity to speak in face-to-face meetings. For example, a subordinate may be unwilling to criticize the ideas of a superior for fear of reprisal. Examples of sending - social influence problems are:

- **Evaluation apprehension** - fear of negative evaluation may cause members to withhold ideas and comments (Diehl and Stroebe, 1987). For example, if a person has ideas that he feels may be useful but is unsure of their quality or appropriateness, he may not be willing to submit them publicly for fear of criticism.
- **Conformance pressure - politeness** - members may be reluctant to criticize the ideas of others due to politeness (Hackman and Kaplan, 1974). For example, if one person presents an idea, others may not criticize it for fear that the contributor will feel bad.
- **Conformance pressure - punishment** - members may be reluctant to criticize the ideas of others due to fear of reprisals (Hackman and Kaplan, 1974). For example, if a powerful group member presents an idea, others may not criticize it for fear of receiving punishment.

- **Influence domination** - a group member may exercise undue influence over the group, reducing opportunities for others to contribute (Jablin and Siebold, 1978). For example, an expert may command such respect that others may not wish to offer opposing ideas. Group members may view supervisors similarly; i.e., when supervisors will make the ultimate decision, others may not wish to offer opposing ideas.
- **Socializing** - non task discussion may reduce the number of ideas generated by the group (Shaw, 1981). For example, when waiting for a turn to speak, some members may speak to each other rather than thinking of new ideas.

**Receiving and retaining** problems refer to the ability of group members to receive and retain the ideas of others in face-to-face meetings. In typical meetings, group members listen to the speakers and try to remember their comments. Remembering all comments may be difficult and may hinder one's ability to hear new comments. Examples of receiving and retaining problems are:

- **Failure to receive** - members may lack focus on what is being communicated and therefore may miss comments made by others (Diehl and Stroebe, 1987). For example, while waiting their turn to speak, some members may speak to each other (i.e., socialize) rather than listen to the current speaker.
- **Failure to remember** - members may forget comments made by others (Diehl and Stroebe, 1987).

Common features of meeting support groupware are proposed to improve the group work by removing these common communication barriers in order to facilitate information exchange. Meeting support groupware features proposed to counteract these barriers include parallel idea entry, anonymous idea entry, and group memory (Nunamaker, *et al.*, 1991):

- **Parallel idea entry** exists when group members can enter ideas simultaneously; i.e., there is no turn taking. Most meeting support groupware enable parallel idea entry by providing each member with a computer keyboard to enter comments. These comments are then stored in data files that can be accessed by other members (i.e., the group memory).
- **Anonymous idea entry** exists when ideas and comments are exchanged within the group without identification of the contributor. Although anonymous idea entry is more typical, some systems allow users to attach their name to their contributions. Group members can also make oral contributions which forfeit their anonymity.
- **Group memory** can be provided by recording comments made within the group. Meeting support groupware provides for this through the computer's storage capability. All information entered through the computer keyboard is stored in computer files and can be viewed on computer monitors.

Prior to the development of meeting support groupware, researchers had developed many techniques to counteract these problems and increase overall productivity in face-to-face meetings. Many of these techniques are incorporated in meeting support groupware tools; others can also be used in conjunction with generic meeting support groupware capabilities. Examples of commonly used meeting techniques are now discussed further.

### 3. Group and Meeting Techniques

For simplicity, the discussion of meeting techniques will assume that decision making is the purpose of the group meeting. While groups convene for several purposes, most meetings are held either to make a decision or to obtain information which will ultimately lead to a decision. Before proceeding to specific techniques for improving group decision making processes, four commonly used decision rule schemes are now discussed (from Mosvick and Nelson, 1987):

- **Authoritarian** decisions occur when managers make final decisions with little or no input from others. Groups may be involved if the manager seeks information or wishes to create the impression of involvement. This is the most frequent practice found in business.
- **Majority** decisions are most common in peer groups and in public decision-making bodies (e.g., elected officials) which have incorporated the method into their rules of procedure. Its main advantage is that it uses democratic participation in the decision making process. Its main disadvantage is that the "tyranny of the majority" can overwhelm minority views, thereby encouraging factionalism.
- **Minority** decisions may actually result when groups formally adopt the principle of majority rule. Factions and cliques may result in which a few articulate, persistent individuals can dominate the thinking of other group members.
- **Consensus** decisions exist when everyone affected by the decision understands and agrees with what will be done. The most noted practitioners of consensus decision making are found in Japanese industry. For decisions having the greatest impact on organizations, consensus decision making offers perhaps the best means of avoiding future problems. However, consensus achieved through faulty processes (e.g., groupthink - Janis, 1972) have led to poor decisions of historical proportion (e.g., Bay of Pigs invasion in Cuba).

Consensus differs from **unanimity** in that the notion of compromise is appropriate. All group members have veto power when unanimous decisions are required (and thus it is not used very often). For consensus decisions, all group members must agree with the final solution, but there is usually at least an implicit norm that the group should seek a solution that satisfies everyone (Murningham, 1982).

Despite the existence and common use of these four decision making methods, Mosvick and Nelson (1987) identify **decision by default**, or **nondecision**, as the most common approach used by groups. This "nonmethod" often results from indecision or bureaucratic constraints. However, it is important to remember that decisions by inaction are as much decisions as decisions by action.

Several techniques have been put forth to support groups in meetings. The **standard agenda** was perhaps the earliest contribution for adding structure to group processes (Dewey, 1910). Technical professionals and managers in science-based industries find this reflective thinking model to be quite useful because it follows the scientific methods in which most have been thoroughly trained as a standard method of problem solving (Mosvick and Nelson, 1987). The standard agenda's sequence is as follows: 1) define and limit the problem, 2) analyze the problem, 3) establish criteria or standards by which solutions will be evaluated, 4) explore alternative solutions, 5) select the most effective solution, and 6) implement the solution. Several variations of this model have been employed in the many years since its introduction.



The meeting problems listed earlier are often addressed by additional procedural structures provided as process intervention techniques. In studying group decision making, two issues must be addressed: 1) the processing of information and 2) the social-psychological dynamics of behavior. There is a strong mutuality of influence between information-handling activities and social psychological forces; i.e., how information is acquired and evaluated can limit the nature of the social interaction among group members (Guzzo, 1982). For example, the nominal group technique (discussed below) imposes strict guidelines on how information is to be managed and these guidelines in turn limit the ways in which social influence can take place among group members. Conversely, the impact of social-psychological forces on information processing can be illustrated. Janis (1972) identifies **groupthink** as a set of symptoms in which flawed information processing results from social-psychological forces for concurrence seeking within the group.

Founded in early work in group dynamics, several prescriptions, interventions, and techniques designed to increase the performance effectiveness of decision-making groups have been advanced. Guzzo (1982, p. 5) discusses two types of interventions:

Interventions to improve group decision making can be regarded as being of two types on the basis of their primary target: the actions of, or inputs to, group decision making. The first type has as its direct target changes in the behavior of decision-making group members. These changes could be brought about by the creation of new patterns of social interaction, or by the establishment of specific procedures of task accomplishment, for example, requiring groups to adhere to a sequence of steps such as defining the problem, generating alternatives, and then evaluating and choosing among alternatives. Thus, such interactions can affect either or both the social-psychological influences residing in a group and the processes of manipulating and utilizing information.

Input-oriented interventions, the second type, also seek to change behavior in groups, but they attempt to do this indirectly rather than directly. Inputs to group discussion include the distribution of abilities and vested interests among group members, the nature of available information, group size, the reward structure under which a group exists, and time pressures for decision making. Thus it is possible to intervene to arrange inputs and circumstances such that effective decision making will be more likely, without explicitly specifying new patterns of behavior for group members. As with action-oriented interventions, the consequences of input-oriented interventions can affect information processing and social-psychological factors in a group.

These types of interventions can be, and often are, made simultaneously (Guzzo, 1982). Since this paper is concerned with process interventions that might be administered by a meeting facilitator, action-oriented interventions will be examined. Among techniques of this type are brainstorming and the nominal group technique. Each of these techniques can be used for face-to-face and (as will be discussed in greater detail later) computer-supported meetings. Although many other techniques have been put forth, most share many characteristics with brainstorming or the nominal group technique. For example, most investigators agree with Maier (1963) that the forced separation of idea generation from idea evaluation will improve decision making (both examples below reflect this belief). More specific micro-level interventions will be discussed within the section on facilitation.

**Brainstorming** was introduced by Osborn (1957) as a technique for separating the idea generation and evaluation phases. There are four rules for brainstorming: 1) criticism is ruled out - adverse judgment of ideas must be withheld until later, 2) "free-wheeling" is welcomed - the

wilder the idea, the better; it is easier to tame down than to think up, 3) quantity is wanted - the greater the number of ideas, the more the likelihood of useful ideas, and 4) combination and improvement are sought - in addition to contributing ideas of their own, participants should suggest how ideas of others can be turned into better ideas, or how two or more ideas might be joined into still another ideas (p. 84).

Osborn posited that the "average person can think up twice as many ideas when working with a group than when working alone" (p. 228-229). Despite Osborn's claims, numerous other researchers concur that group decision making with interacting groups inhibits creative thinking (e.g., Taylor, *et al.*, 1958). Even when attempts are made to eliminate interpersonal criticisms via brainstorming rules (e.g., rule 1 above), interacting groups still contain inhibitory influences which are not easily dissipated (e.g., Dunnette, *et al.*, 1963), resulting in decreased quality of ideas generated in terms of creativity, originality, and practicality (Collaros and Anderson, 1969). The nature of the inhibiting influences which reduce group performance of interacting groups seem to relate to (Van de Ven, 1974, p. 15-16):

- A "focus" effect wherein interacting groups "fall into a rut" and pursue a single train of thought for long periods.
- The "self-weighting" effect, wherein an individual will participate in the group to the extent that he feels equally competent with others.
- The fact that covert judgments are made but are not expressed as overt criticisms.
- The inevitable presence within most organizational groups of status incongruities, wherein low-status participants may be inhibited and "go along" with opinions expressed by high-status participants even though they feel their opinions are better.
- Group pressures for conformity and the implied threat of sanctions from the more knowledgeable group members.
- The influence of dominant personality types upon the group.
- The amount of time and effort spent by the group to maintain itself; as orientation to maintaining group interaction increases, quality of solutions decreases.
- A tendency to reach "speedy decisions" before all problem dimensions have been considered.

This list is similar to the list of communication problems provided earlier. They reflect both information processing and social-psychological influences on group performance. In an attempt to overcome these problems and take advantage of the creative thinking of individuals working alone, the nominal group technique was devised.

The **nominal group technique** was introduced by Van de Ven and Delbecq (1974) as an alternative technique for separating the idea generation and evaluation phases. Individuals work in the presence of others but do not verbally interact for a period of time. The technique facilitates the generation of a larger number of relevant problem dimensions than interacting groups and facilitates creative problem solving. Van de Ven (1974, p. 16-18) lists several factors which lead to these results. Specifically, nominal groups:

- Create tension by the presence, silence, and evidence of activity of others; thus, the social facilitation effects of the group setting is retained and amplified.
- Avoid evaluation or elaborating comments while problem dimensions are being generated.
- Provide each individual time and opportunity to engage in reflection (search) and force these individuals to record their thoughts.

- Avoid the dominance of group output by strong personality types.
- Prevent premature closure to alternative search process and decision making.
- Allow all participants to share in the opportunity for influencing the direction of the group decision outcome.
- Encourage the generation of minority opinions and ideas, which consequently are more likely to be voiced.
- Tolerate conflicting incompatible ideas since all ideas are simply written on a flip-chart or blackboard without evaluation.
- Alleviate "hidden agendas" or covert political group dynamics which are difficult to develop in writing.
- Impose a burden upon all participants to work and produce their share in the necessary task.
- By means of written expression, induce a greater feeling of commitment and a greater sense of permanence than does spoken expression.

Beyond the nominal group technique (in reducing the influences of other group members) is the **delphi technique** (Turoff, 1970), in which the group does not meet face-to-face. This technique can overcome additional social-psychological impediments to group decision making, but it is not subject to process facilitation as are the above techniques. Using meeting support groupware, automated delphi techniques can be employed which would allow group members to contribute individually over a series of rounds and then discuss alternatives and preferences.

To take advantage of the technological advances in the computer industry, visionaries in the field began to apply computer support to group activities. The resulting systems, known as groupware, have evolved for thirty years into the systems we are more familiar with today. The history and range of groupware will now be discussed.

## B. Groupware

**Groupware** is the class of applications, for small groups and for organizations, arising from the merging of computers and large information bases and communications technology (Ellis, *et al.*, 1991). Unlike most software systems which support interaction between a single user and the system, groupware provides support for user-to-user interaction. A history of groupware development and a sampling of groupware technologies, focusing on meeting support groupware, are presented next.

### 1. A Brief History

While development, use, and study of meeting support groupware is a relatively recent phenomenon that gained momentum during the 1980s, work in this area was begun in the early 1960s by Douglas Englebart at the Stanford Research Institute. Under his direction, a research team created a laboratory at the Augmentation Research Center to explore computer use to augment the human intellect. He was particularly interested in high-performance teams (Englebart, 1963), and designed a system to support collaboration among people working in an asynchronous, geographically distributed environment.

In the late 1960s, the Office of Emergency Preparedness tested a computer-supported group communication system, called the *Delphi Conference*, for responding to national crises. It was based on the Delphi technique for developing consensus among experts (Turoff, 1972), and represented a highly innovative technique for using the computer to structure human communication for information exchange and collective effort to solve a group problem.

Researchers at the New Jersey Institute of Technology began work in the mid-1970s on an experimental environment that would allow study of the use of information technology to support group work (Hiltz and Turoff, 1978). They developed the *EIES (Electronic Information Exchange System)*, which provided four communication capabilities: messages, conferences, notebooks, and bulletins.

At their Palo Alto Research Center, Xerox developed the Colab, an experimental meeting room where computers support collaborative processes in face-to-face meetings. The Colab is designed for small working groups of from two to eight people using personal computers as workstations on a semicircle connected over a local-area network (Stefik, *et al.*, 1987). A large screen display is also provided.

More recently, several meeting support groupware products have been used increasingly in research and business settings. Examples include the University of Minnesota's *Software Aided Meeting Management (SAMB)*, the University of Arizona's *System V* (formerly *Plexsys* and *GroupSystems*), and the Collaborative Technology Corporation's *VisionQuest*. While meeting support groupware is the focus of this paper, other forms of groupware exist and can be used in conjunction with meeting support groupware. Examples are discussed next.

## 2. Groupware Types

Several different information technologies may fall under the umbrella term groupware (Marshall, *et al.*, 1991). Technologies primarily intended to support communication include voice mail, electronic mail, and teleconferencing. Video, audio, and computer conferencing are three types of teleconferencing. Technologies primarily intended to support decision making include decision conferencing and meeting support groupware. Each of these technologies is now defined and discussed further.

**Voice mail** uses a computer-mediated telephone system in which voice communications are digitized and stored until the other communication participants retrieve and listen to the messages, and perhaps further process them by forwarding, copying, or storing them. Voice mail systems combine computer storage and processing capabilities with the conventional capabilities of a private branch exchange, a Centrex switch, or even a personal computer with an add-on board and large storage capacity (Rice and Shook, 1990).

**Electronic mail** uses a computer-based communication system to facilitate transmission and receipt of written correspondence, messages, and text-based information. It allows the creation, editing, sending, receiving, forwarding, and printing of text - all facilitated by computers and telecommunications networks. Various forms include telex, facsimile,

teletypewriter networks, communicating word processors, and communicating word processors (Panko, 1984).

**Video conferencing** uses telecommunication channels for fully interactive video and audio or one-way video and two-way audio, including full motion and full color video, limited motion video, and freeze-frame video images, to facilitate communications between two or more groups. It is much like a face-to-face meeting, although some of the visual context is eliminated. It is the most expensive and least utilized of the various types of teleconferencing, but is also the most glamorous (Rogers, 1986).

**Audio conferencing**, in its simplest form, uses speakerphones at different locations to allow group participation, or uses three-way calling features provided by current switching systems. More complex forms of audio conferencing involving more people and/or more locations may be set up through an operator who gets everyone on-line ("dial-up conferencing") or by the participants' calling a central conferencing number provided by a bridging service at a prescribed time ("meet-me bridge") (Egido, 1990).

**Computer conferencing** is a computer-based communication system for recording and using a textual transcript of a group discussion over varying lengths of time by group members who may be geographically dispersed and who may interact with the transcript simultaneously or at times of their own choosing. A host computer contains the processing software to connect all users when they log on to the system and maintains storage of the transcript (Rice, 1984).

**Decision conferencing** is a method to assist groups in planning, decision making, and problem solving. It utilizes the many perspectives that exist in groups of managers or knowledge workers in organizations. The richness of these varying viewpoints is used to help decision making. Decision conferencing draws on decision theory to assist the decision process and assure that it is rational. The conference is facilitated by a person well versed in decision theory and computer modeling. Unlike most meeting support groupware applications (discussed below), decision conferencing focuses on problem analysis (Quinn, *et al.*, 1985).

**Meeting support groupware** provide computer-based facilities for the exploration of unstructured problems in a group setting (DeSanctis and Gallupe, 1987). The goal of the systems is to improve the efficiency (i.e., speeding up the decision-making process) or effectiveness (i.e., improving the quality of resulting decisions) of decision-making meetings (Kraemer and King, 1988). Different types and implementations of meeting support groupware are further elaborated upon in the next section.

### 3. Meeting Support Groupware

Like the overall category of groupware, there are several different kinds of computer-based systems which can be called meeting support groupware. These systems vary in the particular type of support they are intended to provide, their use of technology, their reliance on facilitation, and the environment in which they are used. These differences are identified in this section.

DeSanctis and Gallupe (1987) classified three levels of meeting support. **Level 1** systems provide technical features aimed at removing common communication barriers, such as large video screens for instantaneous display of ideas, voting solicitation and compilation, anonymous input of ideas and preferences, and electronic messages between members. **Level 2** systems provide decision modeling and group decision techniques aimed at reducing uncertainty and "noise" that occur in the group's decision process. **Level 3** systems feature machine-induced group communication patterns and possibly expert advice in the selecting and arranging of rules to be applied during a meeting.

The number of computers used with meeting support groupware may vary, and other technical devices may be used as well. Technical support can be considered along a continuum. **Workstation** systems represent the highest level of technology support; each group member has his or her own workstation to use in pursuit of group goals. **Keypad** systems represent an intermediate level of technology support; a facilitator uses a single workstation while group members use numeric keypads. These systems are less expensive and more portable, but limit input to numeric evaluations. Idea generation, such as a brainstorming session, requires the facilitator to record ideas given orally by the group. **Chauffeured** systems represent the lowest level of technology support; a chauffeur uses a single workstation to capture and present group input. Input is typically oral, but written methods may also be used to preserve anonymity, such as for voting. These systems are the least expensive and most portable, but also the least useful.

Electronic meetings may also vary with respect to the direction, known as facilitation, supplied to the group (Dickson, *et al.*, 1989). **Facilitated** meetings involve one or more individuals whose purpose it is to help the group achieve its outcomes. Facilitators are experienced in group processes and meeting support groupware use and are not group members. Process facilitators keep the group on task by employing process structuring techniques. Technical facilitators control system use and instruct members in its use. Neither contributes to the meeting content, only to the process. **Chauffeured** meetings enlist an individual only to operate the system - no process support is provided. Thus, a chauffeur is very similar to a technical facilitator. The difference is that technical facilitators get their direction from process facilitators while chauffeurs get their direction from groups. Despite their common names, chauffeured systems may not result in chauffeured meetings. While the technology level influences the facilitation level, it does not dictate it. **User-driven** meetings allow the group to control not only the process but the use of the meeting support groupware as well. Meetings of this type are dependent on technology (i.e., user-driven systems). Each member is provided with a menu of options, each representing a different group process. The group, through a leader or a decision-making rule, pursues a task using an available option.

Another aspect of meeting support groupware use addresses the permanence, ownership, and location of installations. This aspect has been called its delivery mode (Huber, 1984). Costs can vary greatly with respect to hardware, software, facilities, and human resources. **Permanent installations at the user's site** require investment in a dedicated facility (often referred to as a decision room), several hardware devices (workstations, server, screen projection), and support personnel (technicians, trainers, facilitators) in addition to the software. To justify the high costs which result, installations of this type must be used frequently. This cost disadvantage may be offset by the increased convenience of a dedicated, and local, facility. **Portable installations**

require a lower level of investment. Vendors supply the needed equipment (and perhaps process facilitation support) to run a meeting. Advantages include lower costs and location convenience. Disadvantages include a need for an accommodating facility and outsider intervention. **Permanent installations at the vendor's site** require groups to travel or use the facility. This delivery mode represents the minimal investment in meeting support groupware use and may be the best for infrequent or experimental use of these systems. Advantages include the minimal investment and lack of disruption in the workplace. Disadvantages include the need to travel and, again, outsider intervention.

The **decision room** referred to above is a dedicated facility, at a user or vendor site, that houses meeting support groupware and the hardware required to operate it. Characteristic features of decision room layouts are the arrangement of workstations and the provision of one or more public screens. For small and moderate sized rooms (i.e., up to 20 group member workstations), the U-shaped configuration is likely most common. This configuration provides line of sight viewing of every group member by every group member. It also suggests a central location for a public video screen, between and beyond the endpoints of the U. Oval and circular shapes also provide for line of sight viewing of other members, but the best location of the public video screen is less evident in these configurations. For larger rooms (i.e., beyond 20 workstations), two or more concentric U-shaped configurations may be necessary. In addition to showing the output of the meeting support groupware on the public screen, it might also be used to display video, slides, and overheads, integrating these into a seamless multimedia presentation (Marshall, *et al.*, 1991).

Much research has been conducted on the use and effects of meeting support groupware in the past twenty years. This research is now reviewed focusing on systems and implementations that support face-to-face meetings, i.e., meetings in decision rooms. This synchronous and proximate setting allows a facilitator to be used to influence the group process.

### **III. Prior Research**

The body of empirical research on meeting support groupware has grown to a considerable size in the past twenty years and has increased rapidly during the past few years (Dennis and Gallupe, 1993). This topic now represents a recognized research field within the discipline of Management Information Systems. The following discussion of prior research borrows heavily from Pinsonneault and Kraemer (1990) and Dennis and Gallupe (1993). Readers seeking greater detail should consult these authors for a more thorough presentation of the empirical research.

#### **A. Effects of Meeting Support**

One useful classification of the empirical research identifies the effects of meeting support groupware on group processes and outcomes (Pinsonneault and Kraemer, 1990). As discussed in the following paragraphs, groups using meeting support groupware outperformed, were more satisfied and confident, and were more effective (e.g., depth of analysis) and efficient (e.g., lower decision time) than non-supported groups.

## 1. Group Processes and Outcomes

**Group Processes.** Three consistent findings for meeting support groupware effects on group processes have been noted. First, the overall quantity of effort increases for group members in the decision process. Use typically results in more group members participating or greater participation from all group members. Member participation was also more equal and less likely to be dominated by a few members (e.g., George, *et al.*, 1987; Nunamaker, *et al.*, 1987, 1988; Vogel and Nunamaker, 1990). Second, the task focus for group members toward the problem to be solved is higher for meeting support groupware use. Task-oriented communication and clarification efforts are increased for group members (e.g., Jessup, *et al.*, 1988; Nunamaker, *et al.*, 1988). The depth of analysis is also greater when meeting support groupware is used. This is evidenced by a greater number of alternatives analyzed or a greater depth of analysis for each alternative in the majority of studies (e.g., Nunamaker, *et al.*, 1988; Vogel and Nunamaker, 1990). Third, consensus is more often reached by groups using meeting support groupware than by non-supported groups (e.g., George, *et al.*, 1987; Vogel and Nunamaker, 1990). Pinsonneault and Kraemer (1990) offer that greater likelihood of consensus is consistent with increased task focus. More group members are more closely involved with the process and arrive at similar conclusions.

**Group Outcomes.** Three consistent findings have been noted for meeting support groupware effects on group outcomes. First, use typically increases decision quality. In the majority of studies, groups using meeting support groupware outperform non-supported groups (e.g., Bui, *et al.*, 1987; George, *et al.*, 1987). Greater task focus may also contribute to this result. Second, groups using meeting support groupware tend to have greater confidence in and satisfaction with their decisions (e.g., Vogel and Nunamaker, 1990). Other identified findings, such as increased participation, consensus, and decision quality, may influence these higher levels of confidence and satisfaction. Third, groups using meeting support groupware are more satisfied with the group process than their nonsupported counterparts (e.g., George, *et al.*, 1987; Jessup, *et al.*, 1988; Vogel and Nunamaker, 1990). This finding is consistent with most others, including higher consensus, better decision quality, higher confidence in and satisfaction with the decision, increased participation, and lower decision time (i.e., time spent in meetings) (Pinsonneault and Kraemer, 1990).

Another useful classification of research findings is by the effects attributed to features of meeting support groupware, such as parallel idea entry (which incorporates the group memory), anonymous idea entry, and process structuring. Dennis and Gallupe (1993) identify findings which further our understanding of the effects of these features. These are discussed next.

## 2. Meeting Support Groupware Features

**Parallel Idea Entry.** Studies of parallel idea entry by Gallupe and colleagues at Queen's University (Gallupe, *et al.*, 1990, 1991; Gallupe and Cooper, 1991) compared four-member groups supported by groupware to four-member verbal idea-generating groups. The goal of the experiments were to determine the extent to which production blocking (identified earlier) decreased group productivity. The first study found supported groups to generate a greater quantity of unique, high-quality ideas and to be more satisfied than traditional groups (Gallupe,



*et al.*, 1991). The second study (Gallupe, *et al.*, 1990) implemented a delay into the meeting support groupware to simulate the blocking that occurs in traditional settings. This study found the delay groups to perform no better than the verbal groups, suggesting that production blocking was a significant factor. The third study (Gallupe and Cooper, 1991) further restricted idea generation for supported groups. To closely match traditional settings, all supported groups were allowed to enter only one idea at a time. If a given person expressed their idea first, all other persons had to wait until the idea was completed before they could be next to express their ideas. This study found further evidence of major blocking effects in that supported groups were less productive than nonsupported groups. Thus, parallel idea entry reduces production blocking during idea generation.

**Anonymous Idea Entry.** A number of studies originating from the University of Arizona have investigated the effects of anonymity with meeting support groupware. Jessup and colleagues (1990) compared nonanonymous and anonymous four-member groups having groupware support during the performance of an idea-generating task. They found no differences in overall performance or the number of supportive comments, but anonymous groups were more critical and probing, were more likely to embellish ideas proposed by others, and made more comments overall. Jessup and Tansik (1991) studied four-member groups manipulating anonymity. They found no differences in performance or satisfaction due to anonymity, but anonymous group members perceived the supported meeting to have been most effective.

Connolly and colleagues (1990) also studied four-member idea generating groups, manipulating anonymity and meeting tone (confederates were used to provide positive or negative comments about the ideas generated). They found that nonanonymous, positive groups were most satisfied but generated fewer high-quality ideas. Anonymous, negative groups were least satisfied but generated the most high-quality ideas. Valacich and colleagues (1992) studied three- and nine-member idea-generating groups, manipulating anonymity. They found no differences in performance or satisfaction due to anonymity, but anonymous groups were more critical.

**Process Structuring.** Several studies originating at the University of Minnesota and at the University of Arizona investigated the effects of process structure. DeSanctis and colleagues (1989) studied the use of decision heuristics and meeting support groupware. The heuristics that were varied were comprehensiveness and restrictiveness. They found that restrictiveness did not affect group consensus but that comprehensiveness in the form of a general decision heuristic coupled with a computer delivery of specific heuristics dramatically improved group consensus. Easton and colleagues (1989) compared four-member groups with no support to four-member groups following a structured manual stakeholder analysis technique to four-member groups using a single workstation meeting support groupware product providing the same structured technique. They found both structured groups to generate more alternatives, make higher-quality decisions, and have more equal participation, but took more time than the unsupported groups. Groupware-supported groups were more satisfied with the process and the outcomes.

Easton and colleagues (1990) studied the effects of process structure on four- and five-person groups (using meeting support groupware) performing a generate-and-choose task. The process structure divided the group communication into many separate and distinct conversations

in an attempt to reduce the tendency of group discussion to focus on one topic. Groups using the structure generated more ideas, but made lower-quality decisions. There were no differences in satisfaction, participation, and consensus. Venkatesh and Wynne (1991) studied use of different forms of process structuring rules by four- and five-member groups performing a generate and choose task, including: no process structuring, simple process structuring (advocating the need to identify and formulate problems before attempting solutions), and complex structuring (simple process structuring plus a specific methodology for process structuring). The no-structure groups generated more alternative solutions while the complex structure groups made the best overall decisions. Simple structure groups perceived that better communication had occurred and perceived themselves to have the greatest gain in problem understanding.

Most, though not all, of the studies reported in the above paragraphs were conducted as laboratory experiments on university campuses using student subjects. Among field studies, the most comprehensive research has been conducted at IBM. A summary of IBM's experiences using meeting support groupware are presented next.

### **3. Field Experiences at IBM**

One of the most pervasive studies of meeting support groupware use was conducted at 33 IBM sites and included over 15,000 group members (Grohowski, *et al.*, 1990). The authors in this study estimated that one hour of meeting support groupware use was equivalent to 2.61 hours of conventional meeting time. In summing up the experiences gained from using meeting support groupware, the authors document fourteen points:

- Anonymity is particularly beneficial in the meeting process. Electronic meetings overcome a number of traditional problems: groupthink, member status incongruities, fear of reprisals, unequal floor time, etc.
- The effective number of participants in the meeting process is increased. Meeting support groupware effectively changed the structure of the work groups. Electronic meetings caused more levels of management to be involved and to cover more functional areas.
- Electronic meetings are characterized by higher levels of participation. Greater levels of group involvement in the meeting process were also experienced with the use of meeting support groupware. It was also noted that this carried over into the everyday work environment.
- Fewer meetings over less time are required to solve problems. It was reported that projects that would normally involve a large number of small meetings spread out over a number of months are now being done in a fewer number of larger meetings over a shorter period of time.
- Participants stay more focused on the task at hand throughout the meeting. The levels of non-task interaction when using meeting support groupware is lower than historical meetings.
- The pre-planning of meetings takes on increased importance. Included in such pre-planning is who the participants will be, what tools should be selected, and the management of expectations regarding the outcome of the meeting.
- Post-meeting distribution of the meeting data is crucial; output must be disseminated not only to group participants, but between groups when appropriate. The distributed output often forms the basis for a number of managerial decisions and provides meeting documentation.

- Low levels of computer competence have not deterred effective use. Although "keyboard fright" is often given as a concern in the use of automated systems, this has not proved a problem in IBM personnel's use of meeting support groupware.
- The meeting room environment should match the characteristics of the group. In using meeting support groupware in a variety of settings, IBM has found the need to tailor the system environment to the group using it.
- Software systems must be flexible to meet a variety of group applications. Each organization will have a variety of types of decisions which it needs to make, and the software (meeting support groupware) must be flexible enough to accommodate this breadth of applications.
- A decision center will not operate on its own. An infrastructure of staff and support are needed for its success. IBM's current thinking is that five people are necessary: a manager, two facilitators, a facilitator-in-training, and a technician.
- Meeting support groupware helps provide an organizational memory concerning related meetings. Outputs of the meeting often act as a memory for the organization, documenting what occurred during the meeting.
- Meeting support groupware provides structure and control mechanisms for the meeting. IBM found that in using the system the meeting's structure was improved. Facilitators realize that meeting control breaks down when criticism is introduced; thus, it is typically not allowed.
- The propensity to use meeting support groupware reveals its value. Senior level managers at IBM have found the system so helpful that they have championed its use. They have also, on occasion, pre-empted the decision room for use by their own group.

As stated previously, the experiences of IBM are based on extensive study of several groups. Their findings may be typical of many organizations, but it must surely be remembered that the conduct of meetings and the use of technology are both familiar elements at IBM. The inability, in general, to compare findings across settings is addressed next.

## B. Remaining Questions

Despite the many findings from the literature, there is much we do not yet know about the effects of meeting support groupware. There is also a need for more clarity on the role of groups and facilitators. Marked differences have been found in laboratory versus field studies, suggesting that the nature of the group influences findings. Also, in many studies it is difficult to determine whether process structuring from the meeting software groupware or from the facilitator made the difference in the results obtained. These topics are now briefly discussed.

### 1. The Role of Groups

**Laboratory Experiments.** Inconsistent findings for effectiveness, efficiency, and group member satisfaction have characterized some of the early research in meeting support groupware use in the laboratory. For example, some studies found supported meetings to be more effective (i.e., better decision quality) (e.g., Easton, *et al.*, 1989; Gallupe, *et al.*, 1988) while others found no difference (e.g., Gallupe, 1990; George, *et al.*, 1990). Further, some studies found supported meetings to be less efficient (e.g., Easton, *et al.*, 1989; George, *et al.*, 1990) while one other found no difference (Gallupe, *et al.*, 1988). Finally, some studies found supported meetings to

increase group member satisfaction (e.g., Easton, *et al.*, 1989) while others found no difference (e.g., Gallupe, 1990) or decreased satisfaction (e.g., George, *et al.*, 1990).

**Field Study Research.** Comparatively fewer studies have been published concerning field research, but the pattern of findings is much more clear: field studies indicate improvements in effectiveness, efficiency, and satisfaction when meeting support groupware is used (Dennis, *et al.*, 1990-91). In virtually all cases (e.g., Nunamaker, *et al.*, 1987, 1988; Grohowski, *et al.*, 1990) participants found that meeting support groupware improved meeting effectiveness, efficiency, and member satisfaction).

**Differences in the Studies.** Dennis and colleagues (1990-91) offer several differences in the studies which may account for the differences in findings. In particular, the authors suggest that the differences in group process and outcomes relate to the effects of four variables: task, technology, group characteristics, and organizational context. Potentially important differences in task include the type of task used, task complexity, and task clarity, each of which has shown to influence group process and outcomes in prior group research (e.g., McGrath, 1984). Technology differences exist due to the different levels of systems discussed earlier. In particular, meetings can be facilitated, chauffeured, or user-driven.

Characteristics of the group which may be important include: experimental groups are composed of students while organizational groups are composed of managers and professionals, organizational group members have more familiarity with the task, experimental groups have been formed on an ad hoc basis as opposed to the ongoing nature of organizational groups, and experimental groups are peer groups while organizational groups typically have distinct status and hierarchy relationships. Potentially important organizational context influences include: culture and behavior norms serve as a guideline for organizational groups, members of organizational groups have incentives to perform, and problems are more closely related with their experiences.

These differences suggest that groups that are selected for study be well understood. Each brings several characteristics which may color the findings obtained from their study. The role of facilitators is also somewhat clouded in research on meeting support groupware. This role is now discussed further.

## **2. The Role of Facilitators**

Just as meeting support groupware technology can vary across different levels, so to can the facilitation level. In addition, the personal styles of facilitators may come into play. Both the technology and the facilitator provide process structuring which influence group processes and outcomes, but most studies have attempted to separate these effects.

Work by Anson (1990; Anson and Heminger, 1991) has addressed the role of facilitation beyond meeting support groupware. Anson (1990) compared six- and seven-member groups in four treatments: no support, an active process facilitator, meeting support groupware, and both an active process facilitator and groupware. Groups in the no support treatment had lower task performance, cohesiveness, and process perception, while groups receiving both facilitation and

technology support had the highest cohesiveness and process perceptions. In a followup study (Anson and Heminger, 1991), groups using meeting support groupware were compared with and without an active process facilitator. The study found groups having an active process facilitator to have more positive perceptions of the process and task outcomes. Another study (Dickson, *et al.*, 1989) investigated the effects of facilitation on three-, four- and five-member groups performing an allocation task. Groups without either an active process facilitator or a passive chauffeur (assisting only in technology use) displayed less consensus than groups utilizing either an active facilitator or a chauffeur.

The three studies reported here suggest that use of an active process facilitator improves meeting processes and outcomes. Facilitators can assist the group in understanding, using, and adopting meeting support groupware, as well as suggesting process guidelines to improve group dynamics. However, since the effects of facilitation are seldom separated from the effects of the technology, it is difficult to assess its role in electronic environments.

Given the nature of the findings reported here, it is important to adopt a strategy for the selection and study of groups using meeting support groupware and the training of facilitators who will guide their use. These issues are discussed in the next two sections.

## **IV. SELECTION CRITERIA**

In order to successfully implement a research plan, such as the one jointly initiated by members of UHCL and RICIS, (the UHCL/RICIS GSS Research Plan) it is important to carefully select groups for study. Before any research can begin, the most important group must be selected: a steering committee to guide the research plan. In the case of the UHCL-RICIS research plan, a Computer Supported Cooperative Work (CWSS) Steering Committee has been established. At present, the committee is comprised of representatives the Johnson Space Center (specifically the ENG, ISD, and MOD directorates), the University of Houston at Clear Lake, and the University of Houston Main Campus. The broad goal of the research project is to assess group productivity using CSCW work techniques. The use of meeting support groupware is related to this pursuit. To achieve the goal of assessing group productivity, the following objectives have been identified:

- Establish an environment for demonstrating and assessing the effectiveness and efficiency of groupware products supporting different group and meeting activities characteristic of academic, industrial, and governmental settings.
- Evaluate different methods and processes for supporting collaborative work using groupware products in various settings.
- Develop an environment for evaluating and conducting education and training on facilitating and using different types of collaborative products, methods, and processes.
- Establish and maintain an information resource center on groupware technologies and methods.
- Provide an environment for assessing and refining requirements for groupware products.
- Develop prescriptions for using CSCW technologies in education and training.

Due to the nature of the project focus, a team approach (and thus, the steering committee) was chosen to direct all activities.

In addition to specific research objectives, the researchers undertaking any research plan should consider their impact on the groups that they are studying and the impact of these same groups on the overall research plan. In general, selected groups must be compatible with the resources (e.g., people, equipment, facility, purposes) available. As one of the first steps in establishing the research plan, the JSC Case Selection Team, a subcommittee of the steering committee, convened on August 4th, 1993, to determine selection criteria for candidate groups. As a starting point, the following general selection criteria (based partly on criteria from Oppen and Fersko-Weiss, 1992) were considered:

- **Visibility/importance of the group** - to what extent will our contributions to the chosen group have a favorable impact on the overall project?
- **Feasibility of supporting the group** - to what extent can we make a contribution to the group given their task(s) and/or mission?; i.e., what are our chances for success?
- **Group willingness to be studied** - is the group open to being video/audiotaped and willing to respond to questioning by researchers in exchange for room use?
- **Identifiability of research goals** - can research goals for study of the group be envisioned?
- **Group task(s)** - what are the task(s) and/or mission of the groups?; i.e., what do they do in meetings? how do they reach closure or measure success? what are their deliverables?
- **Group meeting cycle** - how often and for what average duration does the group, and any subcommittee, meet?
- **Group facilitation** - does the group supply its own meeting facilitator?

The above criteria (specifically, the answers to the questions raised) provide guidelines for the selection of groups. The JSC Case Selection Team, using the above criteria to stimulate their thinking, derived the criteria below. Criteria for both research (i.e., the study of groups) and practice (i.e., the support of groups) are presented next. Participants were asked to enter required information for selecting groups for study in the computerized meeting facility.

**Criteria for Research.** The JSC Case Selection Team generated the following criteria (and other related comments) for the selection of groups for study:

- Group should meet regularly during the period of interaction.
- Because this is a research project, we need to look at activities that do not span long periods of time.
- Maybe we are in the business of longitudinal studies and we might want to look at at least one group and follow through for a significant period of time.
- The group should represent an activity that is basic, or of sufficient importance that positive results will be viewed as significant, but not of sufficient importance that negative results would create a negative impact on meeting support groupware.
- Select groups who either have a process that meeting support groupware could support or who would be willing to adopt a process (a better one, or if none now exists).
- Select a group who has a strong interest in improving its collaborative environment and a willingness to do some experimentation.
- An application should be complex enough to benefit from meeting support groupware, but not so complex that it is beyond the skills or technology levels available in the project.
- We must be considerate of meeting content sensitivity.
- Select a group with a mid to high proficiency in computer use.

- Project should be a representative type of work that is important to the organization and also somewhat of a repetitive work type such that requirements definitions exist.
- The number of sessions and timeframe should be limited, e.g., less than 10 sessions and not more than 2 or 3 months.
- Use a group that is willing to train or provide its own facilitator(s).
- Does the group have a clear leader to facilitate coordination of a research project?
- Situations where internal facilitators are appropriate, as opposed to external ones, should be defined as a group screening criteria.
- Since this is a research project, we need to look for diversity in the groups that we bring in (on all parameters, i.e., size, meeting schedule, expected outcomes).
- Do we want to use groups that need significant and ongoing use of the computer-based tools?
- Collecting the in-place facilitation processes is going to be time intensive and should be put off until we are seriously considering a particular case.

The above criteria reflect many concerns and also address a desire to stay within the capabilities of the current research plan.

**Criteria for Practice.** The JSC Case Selection Team generated the following criteria (and other related comments) for the support of selected research groups:

- If we have a situation that a group has an in place process, can we document that process and then look at the impact that adding the technology has on the success of that process?
- We need to address how we move a group from a research project to a stand-alone group successfully using these tools but outside the bounds of the research project.
- The Policy Analysis Group is making good progress in defining terms; they are also beginning to identify components of the policy analysis process.
- The Policy Analysis Group uses brainstorming techniques.
- Both the Outreach Group and the Policy Analysis group were formed in the past month or so.
- Who are going to be the facilitators?
- We need to decide if we are working on the technologies or the process facilitation as the goal of this project.

These criteria reflect some indecision on the part of the group concerning what the research plan can provide to the groups. Note that specific groups were discussed within the criteria list.

**Criteria for Research and Practice.** The JSC Case Selection Team generated the following criteria (and other related comments) for the selection of groups for study and for the support of these selected research groups:

- Select groups that have manual experience with meeting techniques, so that this aspect of automation can be evaluated; also, with an experienced manual facilitator, what is the effect and process associated with automated support?
- What is the group's self-assessment?; Are groups that feel that they are successful a better choice than groups that might not view themselves as successful?
- Groups that can provide or train facilitators.
- Do they have trained facilitators?
- Can we foresee a situation where we would undertake a research activity that does not use any (or little) computer-based technology tools?
- Groups that deal with highly controversial activities.

These criteria further reflect the indecision (and some concerns) on the part of the group. While a few themes are recurring in the criteria generated at this meeting (e.g., the need for groups to supply their own facilitators), other aspects are less clear.

**The Experimental Pilot.** Research by Oppen and Fersko-Weiss (1992) incorporate many of the above criteria and others in recommending things to look for in the first pilot application. The following is their discussion (p. 92-93) of the experimental pilot:

The first Experimental Pilot application should be a simple one, for which there is a high probability of payoff from groupware. It should be, in other words, a "shoe in." This test is to confirm that groupware is useful under the best of all possible circumstances. The team should be flexible and easy to work with, willing and able to spend time on the project and eager to see it succeed. The application should be important, but free of major time constraints or serious political implications. As the process of introducing groupware evolves, the cases should get increasingly more difficult. The group size can be increased; the nature of the project should be more complex; the political situation should be more problematic. Later pilot groups may not work as well together and can include people who are resistant to using computers.

The early Experimental Pilot groups should be small and manageable. ... Ideally, initial groups should be between 7 and 12 members. Very small groups don't provide enough diversity and energy to produce a fair test of the groupware product. Issues of manageability arise with groups larger than 12.

Individual cases may vary, but in general, early pilots should last between three and six months. Anything less than three months doesn't offer enough data, and more than six months will normally not provide sufficiently interesting additional information to be worth the effort and expense of continuing to run the pilot. As the piloting continues, the length of time for each pilot can normally be reduced. Under certain circumstances, dictated primarily by the application itself, longer or shorter pilot periods may be indicated.

In addition to the guidelines provided above, Oppen and Fersko-Weiss (1992) provide a checklist for Experimental Pilot Group Selection (p 94):

- The appropriate mix of functional areas is represented.
- Individuals are already assigned to the selected pilot application or can be reassigned.
- Individuals are able to be spared from other critical work to take the extra time that the pilot will require.
- The group has the necessary equipment (or it will be installed).
- Pilot participants are competent PC users currently confident with at least one program.
- Pilot participants are generally respected members of the organization, viewed as influential.
- Pilot participants like to try new things and are interested in being on the pilot.
- Members are outspoken and willing to provide necessary feedback.
- The group works well together.

Unfortunately, even the best laid plans often give way to opportunity or circumstance. The many guidelines provided here may be less useful when organizational or political forces dictate which groups should be studied (or, more specifically, which groups will have access to the limited resources that are a part of the research facility). In these cases, it is still important to guarantee research value from the meetings run for these groups. Proper facilitation may provide the best opportunity for achieving this goal. Facilitation training and micro-level techniques used by facilitators are discussed in the next section.



## V. FACILITATION TRAINING

**Facilitation** is viewed as a set of functions or activities carried out before, during, and after a meeting to help the group achieve its own outcomes (Bostrom, *et al.*, 1993). This leadership may be supplied by a recognized group leader or another member of the group, or by a neutral person not affiliated with the group. When meeting support groupware are employed, this latter form of facilitation is most common (Nunamaker, *et al.*, 1991) and is often referred to as external facilitation (Bostrom, *et al.*, 1993).

The facilitator serves four functions in electronic environments (Nunamaker, *et al.*, 1993). First, the facilitator provides technical support by initiating and terminating specific software tools and guiding the group through the technical aspects necessary to work on the task. Second, the facilitator chairs the meeting, maintains the agenda, and assesses the need for agenda changes. Third, the facilitator assists in agenda planning, by working with the group and/or group leader to highlight the principal meeting objectives and develop an agenda to accomplish them. Finally, in ongoing organizational settings where meeting leaders/facilitators are not group members, they provide organizational continuity by setting standards for use, developing training materials, maintaining the system, and acting as a champion/sponsor (key to successful technology transfer).

Thus, when using meeting support groupware, two forms of facilitation are provided. **Process facilitation** concerns the direction of the group process, but not meeting content. The process facilitator attempts to keep the group focused on the task and moving toward known meeting objectives. This person may be a member of the group, but more typically is not. **Technical facilitation** concerns instruction in meeting support groupware use. The technical facilitator provides direction for the use of specific software tools, but addresses neither the process or the content of the meeting. While one person can assume both roles, it is best to separate these duties to allow the process facilitator to focus full attention on the group process.

This section discusses useful skills for process facilitation. Recent literature reviews (e.g., Hirokawa and Gouran, 1989; Bostrom, *et al.*, 1993) reveal a scarcity of research addressing ways in which group performance can be enhanced using facilitation. The guidelines presented below are derived primarily from the group dynamics literature and thus apply to process facilitation in traditional and electronic environments. After the guidelines are presented recommendations for facilitator training are discussed.

### A. Facilitation Guidelines

Several specific outcomes are sought in decision making groups. The duty of the process facilitator is to help the group to reach desired outcomes. This person must also help the group to avoid flawed processes which may lead to undesired outcomes. The following paragraphs discuss micro-level techniques (not related to over-arching decision making techniques) for encouraging desired outcomes and alleviating flawed processes.

## 1. Encouraging Desired Outcomes

Among desired outcomes in meetings are increased participation, shared understanding, creativity, motivation, and comprehensive evaluation of ideas. Techniques to help encourage these outcomes are now identified.

**Broad participation and involvement.** Guidelines from the group dynamics and meeting facilitation literatures for encouraging broad participation and involvement include:

- Explicitly calibrate members' agreement/disagreement with group outputs and process (Bostrom, 1987).
- Do not allow defensiveness to go unquestioned (Prince, 1981).
- Maintain a secure climate in which members
  - 1) know they will be heard by the group,
  - 2) know they will not be required to justify their ideas, and
  - 3) know that they will not be condemned for disagreeing with the group or for offering ideas of little substance (Hoffman, 1982; Prince, 1981).
- Participate in anonymous idea generation (especially if the leader is a member of the group) (Zagona, *et al.*, 1966).
- Model good group behavior (Delbecq, *et al.*, 1975).
- Protect minority opinions, and encourage group treatment of first positive points concerning the ideas before negative points (Maier, 1963).

**High quality information and shared understanding.** Guidelines from the group dynamics and meeting facilitation literatures for encouraging high quality information and shared understanding include:

- Establish shared outcomes for the group (Bostrom, 1987).
- Visually present ideas generated by the group (Maier, 1963; Delbecq, *et al.*, 1975).
- Use pointers, relevancy challenges, backtracking, and paraphrasing to maintain focus on high quality information and ensure shared meaning (Bostrom, 1987).
- Quickly sanction disruptive behaviors during individual work periods by addressing group with pleas to allow others to work (Delbecq, *et al.*, 1975).
- Periodically summarize the tasks being undertaken and the outputs that have been completed (backtracking) or still need to be accomplished (Maier, 1963).
- Use specific worded questions, prompts, and paraphrases to develop shared meaning (Ogdin, 1982).
- Encourage identification of specific evidence for solution criteria (Bostrom, 1987; Maier, 1963).

**Creativity.** Guidelines from the group dynamics and meeting facilitation literatures for encouraging creativity include:

- Use an outcome frame to maintain a positive focus on moving to the desired state (Bostrom, 1987).
- Use the as-if frame to prevent members from becoming bogged down by transitory obstacles (Bostrom, 1987).
- Use non-specific worded questions and prompts to encourage expression of members' own perspectives (Ogdin, 1982).

- Maintain a climate in which members feel secure in looking for new ideas without fear that their current favorite will be discarded (Hoffman, 1982).
- Encourage the use of analogies and metaphors to stimulate different ways of viewing the problem (Maier, 1963; Prince, 1981).
- Encourage extended idea generation (Zagona, *et al.*, 1966).
- Present the task in terms of being a problem to be solved instead of a decision (choice) to be made (Maier, 1963; Zagona, *et al.*, 1966).
- Resist non-process clarifications of instructions or topic descriptions for idea generation; especially important is to not point out example responses which could channel or narrow members' thinking (Maier, 1963; Delbecq, *et al.*, 1975).
- Encourage hitchhiking of ideas by using other members' ideas to stimulate one's own creativity (Osborn, 1957; Maier, 1963; Delbecq, *et al.*, 1975; Hoffman, 1982).
- Separate idea generation from evaluation (Osborn, 1957; Maier, 1963; Delbecq, *et al.*, 1975; Hoffman, 1982).

**High group motivation and energy.** Guidelines from the group dynamics and meeting facilitation literatures for encouraging high group motivation and energy include:

- Show interest and involvement in the subject (1981).
- Rotate leadership among members (if possible) to breed strong motivation to work with others and to cooperate with the present leader (Prince, 1981).
- Keep the meeting moving at a fast pace (Prince, 1981).
- Use humor to engage the group, maintain rapport, and highlight important points (Prince, 1981).
- Exercise firm leadership for groups under stress, but permissive, emotionally expressive leadership for groups not under stress (Zagona, *et al.*, 1966).
- Instruct the group in the structured group process techniques that will be used (Maier, 1963).
- Reformulate problems such that
  - 1) they are under areas which the group can control, and
  - 2) they are situational rather than (personal) behavioral terms (Maier, 1963).
- Deal directly with emotions and feelings of members by
  - 1) allowing harmless expression,
  - 2) giving assurance to individuals,
  - 3) allowing long pauses,
  - 4) listening to emotions without evaluation and judgment,
  - 5) asking questions to elaborate on feelings, and
  - 6) involving all members in the discussion (Maier, 1963).
- Constructively reframe disagreements as problems which the group must solve (Maier, 1963).

**Fair, comprehensive evaluation.** Guidelines from the group dynamics and meeting facilitation literatures for encouraging fair, comprehensive evaluation include:

- Use group process structuring techniques to
  - 1) extend problem definition, alternative generation, and evaluation phases (Maier, 1963),
  - 2) postpone a strong valence (level of support) to avoid becoming attached to a single solution alternative before all alternative have been generated and evaluated (Hoffman, 1982),

- 3) increase attention to each idea generated (Delbecq, *et al.*, 1975), and
- 4) separate idea generation from evaluation to sustain problem-mindedness (Maier, 1963; Delbecq, *et al.*, 1975).
- Facilitate group screening and censoring ideas, but do not participate in evaluating the content of ideas (Zagona, *et al.*, 1966).
- Ensure that all generated ideas are examined by the group by pacing sequentially through lists of ideas (Delbecq, *et al.*, 1975).
- Do not dwell on near-successes or obstacles to a single point of view (Maier, 1963).
- To narrow down a list of ideas, have each person select a few and then integrate or combine these (Maier, 1963).
- Train groups in the evaluation procedures to avoid resistance to techniques (Maier, 1963).
- Use a straw vote - discussion - final vote sequence to elicit group choice of important points (Huber and Delbecq, 1972).
- Evaluate both sides of ideas, especially those for which implicit group consensus has formed by
  - 1) eliciting favorable and unfavorable, pro/con, for/against statements (Maier, 1963; Hoffman, 1982),
  - 2) eliciting relative merits between competing ideas (Maier, 1963), and
  - 3) appoint an objective, non-emotional devil's advocate role to air counter-arguments (Guzzo, 1982; Janis, 1972).
- Use formal techniques to elicit and combine members' subjective preference or importance weights (Cook and Hammond, 1982); for example
  - 1) judgment analysis in which members weight a series of holistic profiles which are analyzed for aggregate factor weights and judgment consistencies (Cook and Hammond, 1982),
  - 2) multi-attribute utility analysis in which members assign importance weights to solution attributes and the solutions are ranked based on the combination of their attribute values and the attribute weights (Guzzo, 1982), and
  - 3) analytical hierarchy process in which members make subjective pairwise comparisons between alternatives that can be aggregated to produce a preference ranking of alternatives (Hoffman, 1982).
- Ask for a second solution after a first is found to encourage comprehensive evaluation of the alternatives (Maier, 1963).
- Stimulate some disagreement over solutions, especially decisions not to act that are accepted by the majority (Maier, 1963).
- Separate the problem into parts that can be handled separately by the group (Maier, 1963).

## 2. Discouraging Undesired Outcomes

In addition to promoting desired outcomes in groups, facilitators must recognize and combat flawed processes which lead to undesired outcomes. Many of the same techniques that were introduced and applied above are useful under these circumstances. Some of these are now discussed further.

**Flipping.** Occasionally, group members will become mired in a problem state. Flipping is used to get these individuals to think in terms of outcomes. For example, when an individual



states what's wrong with a given situation, the facilitator can ask the individual to state the same situation in terms of a desired outcome, i.e., what do you want instead of the current situation? This technique is also known as **Outcome framing** or **As-if framing**, since the individual is asked to reframe the current situation as if what was desired was the actual situation. Reframing changes one's internal context, the way a person internally understands events, in order to change its meaning to that person. When the meaning changes, the person's responses and behaviors also change (Bostrom and Clawson, 1990).

**Backtracking.** When meanings are not clear in meetings, facilitators should backtrack to attempt to understand in his or her own words what someone else has said. Backtracking is used in several instances. If new members join the group, it is useful for recapping what has transpired previously. When negative comments are given, it is a useful way to reframe the comments in a positive manner (and thus achieve outcome framing). When objections are raised, backtracking is a useful way to ensure that the objection is being addressed before the group (Bostrom, and Clawson, 1990). Finally, since it is a form of active listening, it is an excellent way of developing and maintaining rapport.

**Chunking.** Ideas are often presented in an inappropriate context. They may be too broad or too specific for the discussion at hand. Chunking allows contributors to consider other related aspects of the idea they are working with. For example, for a given problem statement, **chunking down** requires individuals to answer the questions what stops me? and what do I want instead? Facilitators help individuals to chunk down by encouraging them to 1) identify specific obstacles that need to be overcome, 2) break the outcome into smaller, more manageable pieces, 3) identify what is and is not under their control, and 4) sort and prioritize smaller outcomes. **Chunking up** requires individuals to answer the question what will having this outcome do for me? Facilitators help individuals to chunk up by encouraging them to 1) put the outcome in a larger context, 2) clarify their reason or purpose for wanting the outcome (e.g., criteria), 3) identify the motivation or desire to accomplish the outcome, and 4) see alternatives if the outcome can't be achieved (Bostrom and Clawson, 1990).

**Word challenges.** When group members provide information which is unclear, word challenges can provide a path to higher quality information. **Noun challenges** request specific information concerning statements made. For example, if someone indicates that "my costs are down," the facilitator can prompt this person to identify "which costs specifically are down?" When language is vague concerning persons or events, facilitators can present noun challenges to ask who or what specifically is being discussed. **Verb challenges** request clarification of how an event took place. For example, if someone indicates that "he rejected the proposal" the facilitator can prompt this person to indicate "how specifically did he reject the proposal?" **Comparators** request a comparison to other known entities. For example, if someone indicates that "our sales are low," the facilitator can prompt this person to explain "your sales are low compared to what?" Word challenges help group members to understand what exactly is being said (Bostrom and Clawson, 1990).

**Relevancy challenge.** A common problem in meetings is for members to get off track. They can do this in a number of ways, including the introduction of information that is unrelated to the current discussion. This presents a situation where the process facilitator benefits from

having some knowledge of the content area. Without suggesting what the content should be, the facilitator must recognize when a comment is unrelated to the discussion. Rather than ignoring the comment or correcting the contributor, the facilitator should issue a relevancy challenge. For example, the facilitator might ask "how does this relate to our goal of increasing sales volume?" The contributor can then either provide clarification for the link to the current discussion, or withdraw the comment realizing that it is unrelated.

## **B. Training Recommendations**

Facilitation is more art than science. It can also be thought of as a craft passed down from one artisan to the next. Like many endeavors, experience and practice are the best methods for training. As little has been published concerning specific recommendations, the discussion which follows is based largely on the personal experiences of the author as a facilitator. This section provides training recommendations for process and technical facilitation. The former requires a broad range of skills and familiarity with several varied group processing techniques. The goal is to possess strategies that can be matched to the problems one encounters in meetings. Table 1 provides examples of problems and effective strategies.

The latter, technical facilitation, requires skills in a much more narrow domain. All that is required is to be familiar with the meeting support groupware being used. Since this is the more straightforward, and since electronic meeting process facilitators should also be familiar with the technical aspects of facilitation, discussion will begin with technical facilitation.

### **1. Technical Facilitation**

Skills needed for technical facilitation include tool familiarity, file management familiarity, error recovery methods, and tool interface capabilities. Of course, an overall prerequisite would be familiarity with computers and computer networks. Given this level of literacy, the technical facilitator can acquire the necessary skills in the areas identified. These are now discussed further below. It should be noted that no formal training may be necessary; just several hours of practice and trial using a meeting support groupware product.

**Tool familiarity.** The technical facilitator will serve as a teacher and trainer to users of the meeting support groupware. The ability to teach requires extensive knowledge of the subject, in this case the groupware itself. Tool familiarity begins with reading the vendor-supplied manual for operation of the groupware product and continues with formal testing of each operation that is described. A useful practice for both the technical facilitator and the group members who will need his or her direction is the creation of detailed instructions for tool use. Some tools are easy to use and also provide instructions on screen. For example, a brainstorming may instruct the user to strike the **F3** key to enter a comment and the **Enter** key to submit the comment. Facilitators may need only to refer users to their monitor for additional direction. Other tools are more complex and may require the facilitator to reiterate or list needed instructions. The organizing tools in several different meeting support groupware packages fall under this category.

### **Common Meeting Problems**

- Lacking clear goals; rambling or wandering between topics or issues without resolving them
- Lacking rapport or resourcefulness; being overly negative or critical
- Lacking clear procedures and agenda; facilitator getting hooked into content
- Assuming others think as you think or know what you think
- Lacking broad participation
- Individuals dominating the discussion
- Mistaking assumptions and interpretations for facts, or not making assumptions explicit; not verifying information
- Listening passively or not at all
- Getting locked into a rut or narrow train of thought
- Avoiding conflict or letting it escalate emotionally
- Paying attention to yourself when you need to notice the other person/group
- Group becomes dependent on facilitator as expert

### **Effective Facilitator Strategies**

- Explicitly developing well formed goals/ outcomes and keeping groups focused on outcomes
- Monitoring levels of, and encouraging rapport, resourcefulness, and a positive tone
- Focusing on and structuring the process
- Recognizing and using individual differences
- Encouraging non-participating members
- Counteracting dominance behaviors
- Generating and using high-quality (accurate, shared) information
- Encouraging active listening
- Stimulating creative thinking - expand/ change boundaries of group exploration
- Using conflict constructively
- Paying attention to the group and using your feelings as a barometer of the group state
- Group empowerment

**Table 1. Meeting Problems and Facilitator Strategies**

(from Bostrom and Clawson, 1990)

Beyond familiarity with the use of groupware tools in their intended manner, facilitators should also become familiar with how to "get out" of situations that might exist when users press the wrong keys at the wrong time. This level of familiarity can only be achieved over time, with careful attention to problems and a documenting scheme to record such situations as they occur.



**File management familiarity.** Closely related to tool familiarity is familiarity with the way the groupware product manipulates and stores files. The value of this knowledge includes better error recovery methods and tool interface capabilities, discussed below, and more options for group support. Most meeting support groupware products are sufficiently sophisticated to allow files to be imported into or exported from the system. If this is the case, familiarity with any and all commands to achieve these file manipulations should be sufficient. In cases where import and export are not expressly allowed, a technical facilitator can learn file naming, addressing, storing, and formatting conventions and replicate these to achieve the desired capabilities. For example, if a discussion tool allows the creation of several categories for discussion, the tool should ideally allow the categories to be imported from an external file (most current meeting support groupware do allow this capability currently). However, if this is not the case, the technical facilitator need only determine the name and format of the file created after keyboard entry of the categories. The off-line creation of one or more files would allow quicker entry of the categories during a meeting. Files created as such would merely be renamed to coincide with the system name. It should be noted, however, that the creation and maintaining of ASCII files may be necessary to allow these shortcuts to be achieved.

While it is much more common, and preferable, to rely on the explicit capabilities of the system, familiarity with the system's file management procedures may allow the facilitator other capabilities. These may prove useful in cases where speed is critical to the process.

**Error recovery methods.** The least favorable outcome from an electronic meeting may be the loss of data. This is especially true in the latter stages of a meeting where larger volumes of data have been generated. Since errors may be of many types and are not always anticipated, a given meeting support groupware tool may not have very sophisticated error recovery methods in place. A technical facilitator may be able to augment these methods through knowledge of the file management procedures used by the system. If an error does occur and data appears to be lost, the files used by the system to store information for a given tool may be investigated. For example, suppose that a brainstorming tool creates a group file of comments from several individual user files of comments. Also suppose that a "system crash" deletes the group file and also ignores the individual user files. It may be possible in such an instance for the technical facilitator to quickly and off-line merge the contents of the individual file into a group file named to conform to system conventions. Typically this will require that ASCII files be created and maintained to allow the technical facilitator to intervene.

**Tool interface capabilities.** Meeting support groupware is useful for the conduct of the various meeting phases of the group. There are also times, however, where the capabilities that the group is in need of are not related to the meeting processes supported by the groupware. For example, it may be that for a problem being studied the group requires a spreadsheet model of the data relevant to the problem. Group members should be able to quickly and easily move between the groupware tool and the spreadsheet. In many instances, data from the spreadsheet may need to be incorporated into the groupware tool. This is largely a file manipulation concern. Import and export capabilities discussed earlier relate here as well. The meeting support groupware, and other tools, may explicitly provide capabilities for data sharing. When this is not the case, the technical facilitator may be able to achieve the same ends by manipulating and renaming files off line. Once again, this ability may require that all files imported and exported by the systems be

in an ASCII format. The result of these efforts is a seamless delivery of a broader variety of tools that can be used to support group work.

For new facilitators (i.e., individuals with no prior experience or familiarity with group facilitation techniques) in electronic environments, technical facilitation is the best place to start. This approach allows the facilitator to first obtain familiarity with meeting support groupware. This will prove useful for many of the duties of process facilitation. It also allows the technical facilitator to observe the techniques used by the process facilitator during the meeting, resulting in somewhat of an apprenticeship relationship between the technical facilitator and the process facilitator. Through this observation, and additional training, the technical facilitator can become ready to take on the duties of process facilitation. The acquisition of process facilitation skills is now discussed.

## **2. Process Facilitation**

Skills needed for process facilitation include technique familiarity, tool familiarity, agenda setting, and perceptual abilities. This person should also have a familiarity with computers and computer networks. Formal training is often provided via two- or three-day seminars where new process facilitators observe experienced facilitators and become familiar with the techniques that they apply. The detail provided by such a training program is beyond the scope of this paper. However, the skills discussed below would be covered in such a program. As with technical facilitation, several hours of practice and trial using meeting techniques is one of the best forms of training.

**Technique familiarity.** For both macro-level techniques such as brainstorming or the nominal group technique and micro-level techniques such as flipping, chunking, and relevancy challenges, the process facilitator must be familiar with their rules and use. Just as the technical facilitator relies on the groupware manual for a first line of training, the process facilitator must be familiar with the literature on running effective meetings. This paper has listed several specific actions and techniques that can be applied in given situations. Further, many noted scholars on the subject have been cited. Process facilitators should become familiar with their contributions, look for situations in which they might be applied (n.b., this relates to the perceptual abilities of the process facilitator which will be discussed further below), and practice their use. One very important point to consider is the level of disclosure to meeting participants on the techniques being applied to the process. Techniques aimed at bringing about constructive processes can and should be shared with the group so as to enlist their full cooperation. Techniques aimed at ending or overcoming destructive processes should not be explicitly recognized so as to keep from being critical of any group member. Members who have been criticized, especially by a facilitator, may withdraw from further participation in the meeting.

**Tool familiarity.** If one has taken the recommended path through technical facilitation prior to attempting process facilitation, one should already be very familiar with the meeting support groupware tools. However, if we can assume that a technical facilitator is present, then the process facilitator needs only concern himself or herself with the general capabilities of these tools. For example, if the group task requires members to generate a list of alternative solutions to a given problem, the facilitator should know which tools are appropriate for this endeavor and

which are not. This level of knowledge will allow the facilitator to map specific group objectives to a sequence of meeting support groupware tools. This is typically done prior to the meeting as part of the agenda-setting duties of the facilitator and is discussed further below. Situations may also arise in meetings where the group wishes to deviate from the agenda. In such situations it is important for the facilitator to be able to suggest the appropriate groupware tool.

**Agenda setting.** The goal of agenda setting is to create a path toward meeting objectives. As mentioned earlier, the standard agenda was introduced near the beginning of this century as a means of adding structure to decision-making processes (Dewey, 19190). For problems which are relatively straightforward (i.e., they conform to the identify, evaluate, select sequence in the standard agenda), there is little difficulty in establishing an agenda and matching appropriate tools to support each agenda step.

When called upon to facilitate a meeting, the process facilitator should first meet with the group leader or other representatives of the group to learn their objectives. It is **very important** that the group have and share specific objectives, not only for the group as an entity but for the meeting to be facilitated. If the group is not yet able to identify their objectives, they are not able to be helped by a process facilitator. Assuming that group objectives are stated and clear, the facilitator works with group representatives to break down the objectives into smaller and better defined steps. For example, an objective of adopting a marketing campaign that will increase sales should begin by identifying influential factors on sales now and in the future. By breaking the task down into these manageable steps, the facilitator is able to help the group to identify or generate the information they need to meet their objectives. As indicated above, agenda setting is best done prior to the meeting so that it can be communicated to all participants. This allows them to be prepared so that they might contribute to the fullest extent. However, while proper planning dictates the preparation of an agenda in advance, it is pointless to adhere to an agenda that is not benefiting the group. A process facilitator must be able to adjust the agenda "on the fly" to move the group towards productive ends.

**Perceptual abilities.** Perhaps the most important abilities that a process facilitator can possess, and for some the most difficult to obtain, are related to the powers of perception. No matter the situation, the role of the facilitator is to match an appropriate response to the situation. Such sensory acuity will allow the facilitator to detect patterns or states such as the establishment of rapport between the group and him or herself, the employment of useful or harmful frames for considering issues, or the existence of confusion or disagreement. These patterns and states must be noted in individuals, in the group as a whole, and in the facilitator's actions. Like many other facilitation skills, there is no substitute for practicing such active observation and listening skills.

## VI. CONCLUSION

There is much that is known about meeting support groupware and much more that is yet unknown. This technology has great potential for assisting decision-making groups, and several studies have found it to deliver on this potential. However, for any team wishing to use this technology or understand the effects of its use, careful attention must be given to the groups that are receiving support and the guidance of these groups in their use of the technology.

This paper investigated meeting support groupware. An historical background and survey of the literature were provided to familiarize the reader with its origins and the prevailing thoughts of the research community as to its effects. Guidelines for selecting groups for study as part of an overall research plan were then provided. These were taken from the literature and from persons for whom the information in this paper was targeted. Finally, guidelines for facilitation training were discussed. Familiarity with known and accepted techniques are principle duties of the facilitator and any form of training must include practice in using these techniques.

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